National Records of Scotland

Comparison of Populations of Non-Standard Geographies Constructed from Different Small Area Geographies

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Seven different geographies;

- Two National Parks;
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- 353 Multi-member Wards;
- 23 Nomenclature of Units for Territorial Statistics level 3; and
- 41 Local Administrative Unit 1 (formerly NUTS4),

were constructed by aggregating from three types of small area geography – postcodes, Census output areas and data zones, using the 2011 boundaries for each.

Using the 2011 Census population of the small area geographies, we estimated populations for the seven large geographies. For each geography, this resulted in three different population estimates – one based on postcodes, one based on output areas and one based on data zones.

The population based on postcode estimates were assumed to be the most accurate, as postcodes are the smallest area for which 2011 Census populations are available and so fit most precisely into larger geographies. The accuracy of the output area and data zone based population estimates were then compared with the postcode based population estimates.

Output area based population estimates are very close to postcode based population estimates for all geographies.

2011 Data zones produce very close estimates for Community Health Partnerships, UK Parliamentary Constituencies, Scottish Parliamentary Constituencies, Nomenclature of Units for Territorial Statistics level 3 and Local Administrative Unit 1. They can also be used to produce reasonable estimates for National Parks and Multi-Member Wards (MMW) – with an average (absolute) difference of less than 5 per cent between the data zone populations and postcode populations for MMW. Although estimates are reasonable for some Multi-Member Wards others differ greatly.

Introduction

1.1 The purpose of this report is to detail the work carried out in November 2014, on analysing how populations of seven different non-standard geographies varied if they were constructed out of postcodes, output areas or data zones. There is an increasing demand for non-standard geography populations and this work was carried out in order to establish whether they could be built up from data zones or output areas (as data zones populations are updated every year, it would be very useful if they could be used to construct different geographies).

1.2 This work was carried out in conjunction with the Scottish Government Statistical Policy Unit, Geographic Information Science & Analysis Team (GI-SAT) and the Geography and Population & Migration Statistics branches of the National Records of Scotland (NRS).

1.3 The purpose of the work was to assess how well three small area geographies – postcodes, output areas and 2011 data zones could be matched to seven different non-standard geographies, through seeing how the population estimate changed depending on which small area was used.

1.4 Population estimates were based on 2011 Census population estimates for postcodes, output areas and data zones.

1.5 Non-standard geographies that were not based on postcodes, output areas or data zones were chosen – and each of the three 'small area' geographies were then mapped to each of the non-standard geographies. The non-standard geographies investigated were:

National Parks – there are two National Parks in Scotland – The Cairngorms National Park (created in 2003, revised in 2010) and The Loch Lomond and The Trossachs National Park (created in 2002). Their boundaries were set by wide-spread public consultation with interested groups.

Community Health Partnerships (CHPs) – there are currently 34 Community Health Partnerships in Scotland, for the most part, these have been based on the 32 Council areas, however 1 Council area (Fife) is split into multiple CHPs.

UK Parliamentary Constituencies (UKPCs) – Since 2005 there have been 59 UK Parliamentary Constituencies. Their boundaries are set by the Boundary Commission for Scotland and are based on Electoral Wards.

Scottish Parliamentary Constituencies (SPCs) – there are 73 Scottish Parliamentary Constituencies – they were set in 1990 by the Boundary Commission for Scotland but were updated for the 2011 elections.

Multi-Member Wards (MMWs) – there are 353 Multi-Member Wards which were created in 2007 by the Local Government Boundary Commission as a replacement for the Electoral Wards. Their boundaries are loosely based on the old Electoral Ward boundaries. MMWs also change outside of statutory reviews with council amendments, as such they have changed since first being created in 2007.

Nomenclature of Units for Territorial Statistics (NUTS): Nomenclature of territorial units for statistics is a hierarchical system for dividing up the economic territory of the Eurpoean Union (EU). There are three levels of population estimates for the NUTS geography that have to be provided under EU Regulation. For Scotland there are 1 NUTS1 area, 4 NUTS2 areas, 23 NUTS3 areas.

There are also 41 Local Administrative Unit 1 (LAU1) areas (formally NUTS4) and although these are not required by EU regulation they are still published on the National Records of Scotland website.

1.6 Three small area units were used to construct the non-standard geographies listed above, all using their 2011 boundaries (as Postcodes and Output Area populations are only available in the 2011 Census).

Postcodes – In 2011, there were 690 postcodes – these are the smallest geographical area for which population data is available from the 2011 Census (only total population is available, there is no age / sex breakdown). Best-fit population estimates based on postcodes were assumed to provide the best estimate for the non-standard geographies.

Output Areas – Output Areas are the standard small area geography for reporting the 2011 Census results and contains an age / sex breakdown of the population. There are 46,351 Output Areas, which were constructed from Postcodes.

Data Zones – there are now 6,976 Data Zones. Data Zones are the standard small area geography used by the Scottish Government and were constructed from Output Areas – again, these have an age / sex breakdown of the population.

1.7 Although each 2011 postcode fitted perfectly into a 2011 output area, which in turn fitted perfectly into 2011 data zones, this had no bearing on how each was assigned to non-standard geographies, as the population weighted centroid of each small area unit was used to assign them to non-standard geographies, without reference to the small area hierarchy of postcodes within output areas, within data zones.

1.8 Population weighted centroids are a standard geographic information system (GIS) procedure for assigning the population of a small geography to a large geography if the small geography does not wholly fit within the boundaries of the large geography – or lie across the border of two large geographies. The population weighted centroid is essentially the point in the area where population density is the same all around the point. For many cases, this will be somewhere with the highest population density within the area. The small geography is assigned to whichever larger geography the population weighted centroid lies in.

1.9 As postcodes are the smallest geographic area, in practice, the postcode construction of non-standard geographies was the closest to their actual boundaries. Therefore, the postcode based population estimates were considered closest to the actual populations of the non-standard geographies (however, most indicators, including age and sex breakdowns are only available at output area and / or data zone level).

Method

2.1 For each non-standard geography, three look-up tables (showing how each type of small area unit could be used to construct the larger non-standard geographies) were provided by the Geography branch of National Records of Scotland. Following Scottish Government Geographical Statistics policies, the population weighted centroid of each small area unit (postcodes, output areas and data zones) was used to assign it to the non-standard geographies.

2.2 Each postcode, output area and data zone could only be assigned to one area in each non-standard geography set. Each of the three types of small area unit was assigned to the non-standard geographies independently of how other types of small area units were assigned.

2.3 For example, postcode ‘X’ could be contained within data zone ‘ G’ and assigned to multi-member ward ‘A’. However, this assignation would be based entirely on where the population weighted centroid of postcode ‘X’ fell, regardless of whether or not data zone ‘G’ was assigned to multi-member ward ‘A’ geographically.

2.4 Using the 2011 Census populations of each postcode, output area and data zone and the look-up of each small area unit to each non-standard geography, populations for each construction of each non-standard geography were produced.

2.5 For example, for each community health partnership, the populations for the geography were constructed from postcodes, output areas and data zones. Therefore, for each non-standard geography, three different population estimates were produced.

2.6 Once the population estimates were completed for each non-standard geography, they were compared against each other, using the estimates based on postcodes – assumed to be the closest estimate to the actual population.

2.7 The results for each non-standard geography are listed fully in separate Excel workbooks (as reproducing the entire set would create a very large Excel file). The summarised results are presented in this paper.

2.8 The comparisons in this report are a comparison of population estimate totals, and are not necessarily an assessment of matching populations covered by the geographies in question. Populations from the best fit data zone and output areas will include population estimates from postcodes that are out with the geographic boundary looked at and likewise will miss some populations that are within the geographic boundary but not in the best fit data zone boundary.

Results – National Parks

3.1 The table below compares different population estimates for the two National Parks within Scotland.

Table 1: National Park Population Estimates

National Park	Postcode based population	Output Area (OA) based population	Difference – OA/ Postcode (%)	Data Zone (DZ) based population	Difference – DZ/ Postcode (%)
Cairngorms National Park	18,932	19,034	0.5	17,521	-7.5
Loch Lomond and The Trossachs National Park	15,261	15,168	-0.6	15,312	0.3

3.2 The overall difference in estimated populations for Loch Lomond and The Trossachs National Park for the different geographies are relatively small, both output area and data zone estimates are within 0.6 per cent of the population estimate using postcodes. However, the difference in estimated populations for Cairngorms National Park at data zone level is relatively large (-7.5 per cent).

Figure 1: Loch Lomond and the Trossachs National Park built by Postcodes, Output Areas and Data Zones

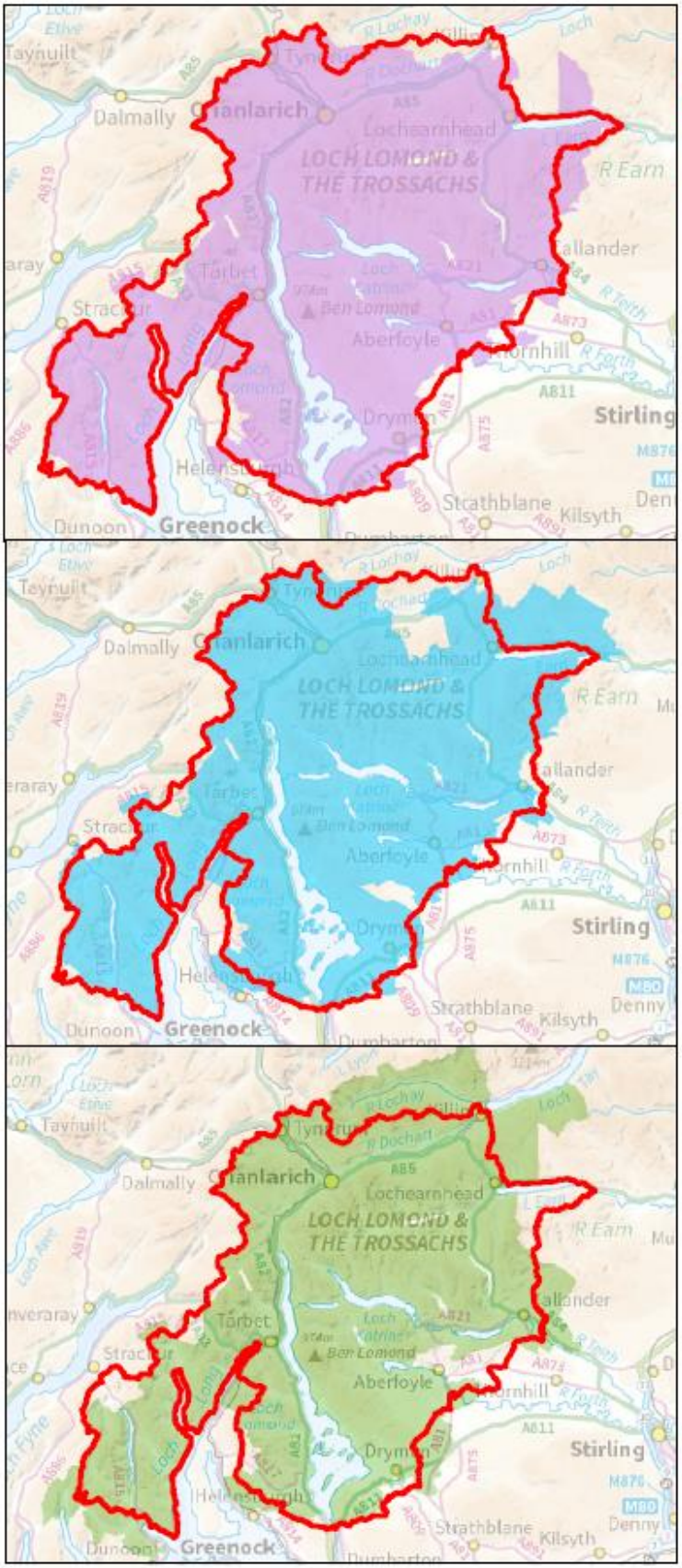
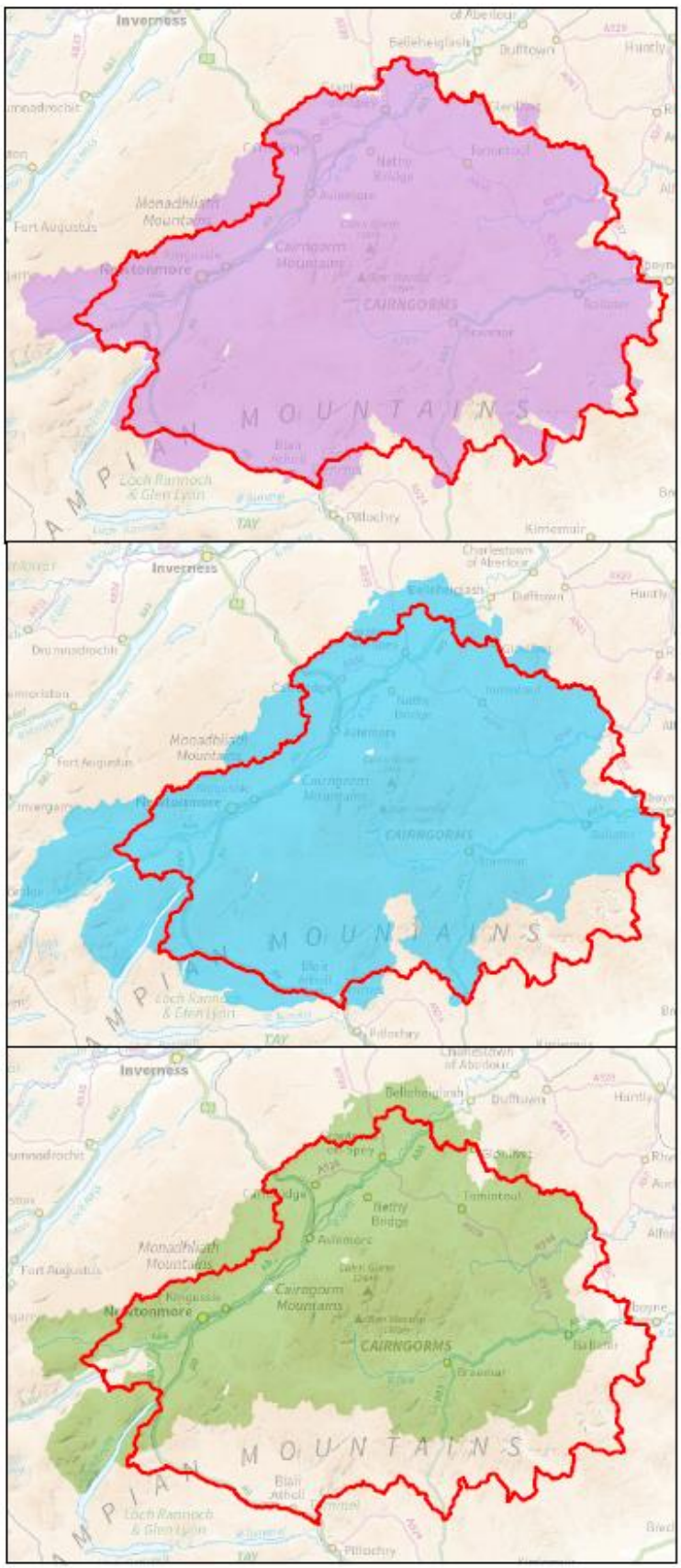


Figure 2: Cairngorms National Park built up from Postcodes, Output Areas and Data Zones



Results – Community Health Partnerships

4.1 Community Health Partnerships (CHP) are generally based on local authority boundaries which are a standard geography (which match data zone boundaries and, by extension, output area and postcode boundaries). For 31 of the 34 CHP, the populations are the same, whether they are constructed from postcode, output areas or data zones. The other 3 arise from CHP which have been constructed from a 'split' Council area.

4.2 The CHP where the population estimates do not match are shown in Table 2. In the case where a Council area has been divided up, aggregating the CHP back to Council area level resolves the differences in population estimates (for example, the three Fife CHP).

Table 2: Community Health Partnerships (CHP) Population Estimates

CHP	Postcode based population	Output Area (OA) based population	Difference – OA/ Postcode (%)	Data Zone (DZ) based population	Difference – DZ/ Postcode (%)
Dunfermline and West Fife CHP	145,501	145,485	-0.01	145,662	0.11
Glenrothes and North East Fife CHP	122,299	122,351	0.04	122,275	-0.02
Kirkcaldy and Levenmouth CHP	97,398	97,362	-0.04	97,261	-0.14

Average population of a CHP = 155,747

Results – UK Parliamentary Constituencies

5.1 As the UK Parliamentary Constituencies (UKPC) boundaries were drawn up by the Boundary Commission for Scotland, they have no relation to any standard geography, so their borders can cut across postcode, output areas and data zones.

5.2 When population estimates based on output areas are compared with population estimates based on postcodes for these areas, 11 are the same, 21 UKPC have higher output area based population estimates and 27 have higher postcode based population estimates.

5.3 When comparing output area derived estimates with postcode derived estimates, the largest positive difference comes to 364 additional people in Glasgow Central (+0.40 per cent) and the largest negative difference comes to 435 fewer people in Gordon (-0.43 per cent). On average, the difference between output area and postcode derived populations are small – around 0.11 per cent per UKPC.

5.4 When population estimates based on Data Zones are compared with population estimates based on postcodes, 10 are the same, 28 UKPC have higher data zone based population estimates and 21 have higher postcode based population estimates.

5.5 When comparing data zone derived estimates with postcode derived estimates, the largest positive difference comes to 2,397 additional people in Glasgow North (+3.35 per cent) and the largest negative difference comes to 1,983 fewer people in Glasgow North West (-2.31 per cent).

5.6 Looking at the difference between data zone and postcode derived populations there are 3 UKPC's that have large percentage differences (Glasgow Central, Glasgow North and Glasgow North West). Upon further investigation an adjustment will be made between two UKPC's, Glasgow North and Glasgow North West.

5.7 Figure 3 details the frequency of proportional differences between data zones based estimates versus postcode based estimates and Figure 4 details output area based estimates versus postcode based estimates.

5.8 The quartile[1] differences and quartile percentage differences of the estimates based on data zones or output areas against estimates based on postcodes for UKPC are shown in Table 3.

Footnote

1**)** Quartiles split a set of data into four equal groups. For example the first quartile (Q1) has the first 25 per cent of the values. The second quartile (Q2) has 50 per cent of values either side. The third quartile (Q3) has 75 per cent of the values.

Figure 3: Frequency of proportional differences of UK Parliamentary Constituencies Populations (compared with Postcode Populations) – Output Area

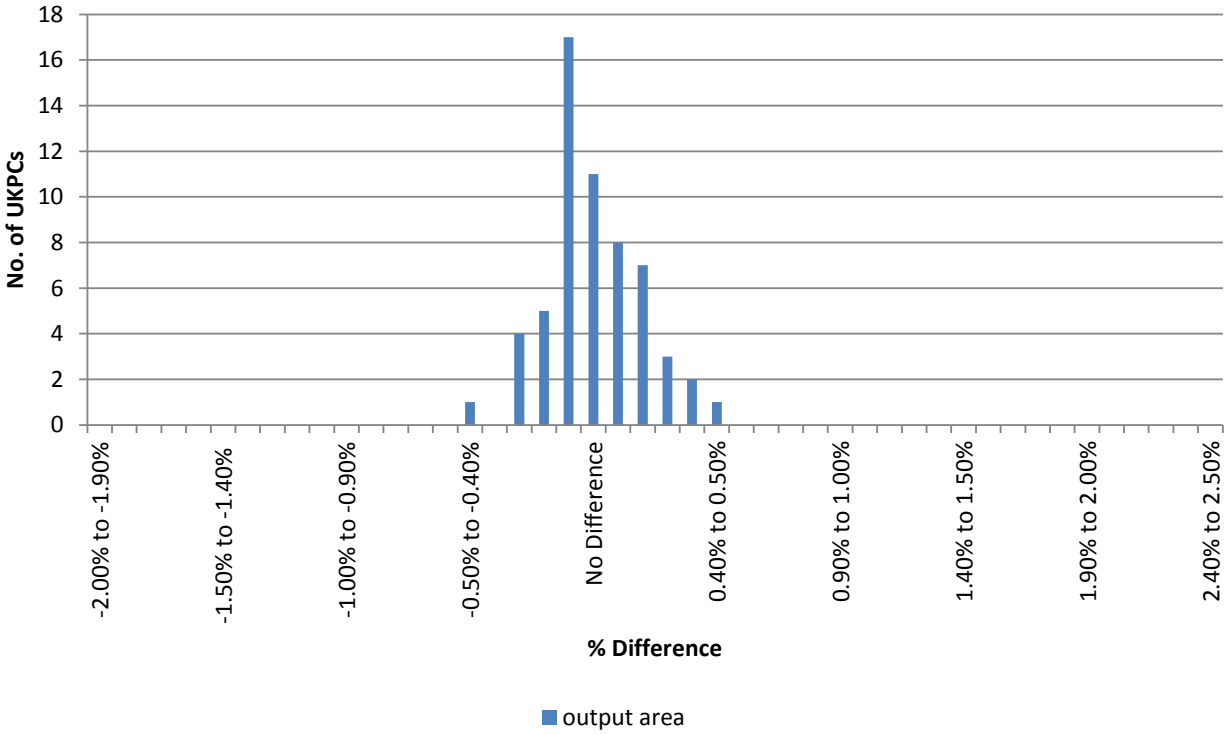


Figure 4: Frequency of proportional differences of UK Parliamentary Constituencies Populations (compared with Postcode Populations) – Data Zone

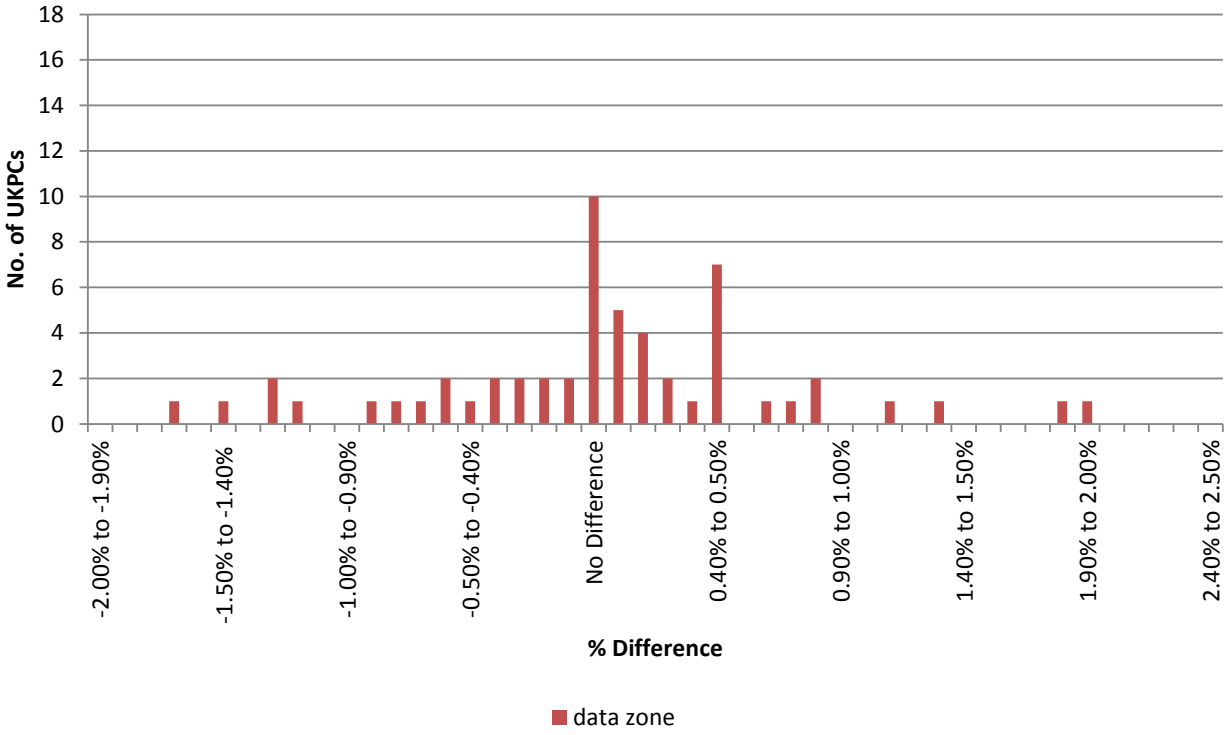


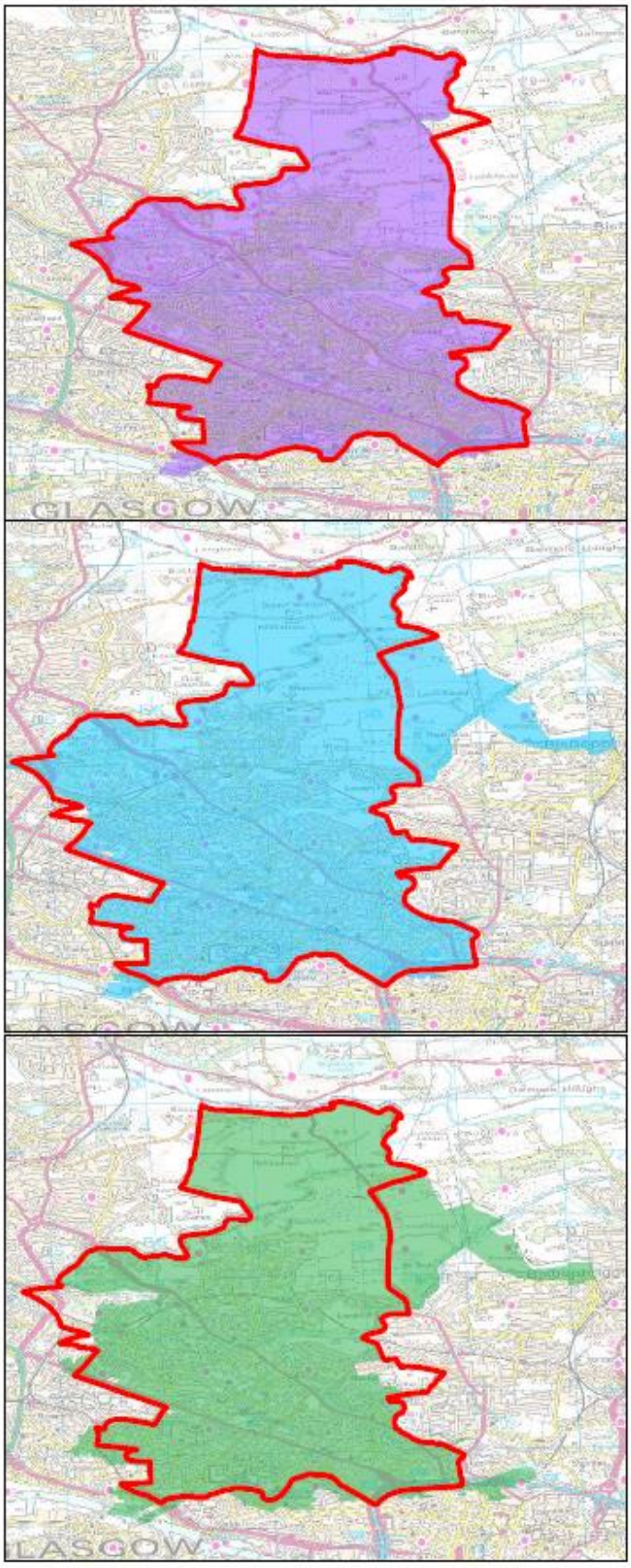
Table 3: UK Parliamentary Constituencies (UKPC) Population Estimates – quartile differences

UKPC Summary	Output area versus Postcode	Data zone versus Postcode	Output area versus Postcode (%)	Data zone versus Postcode (%)
Min	-435	-1,983	-0.43	-2.31
Q1	-67	-214.5	-0.07	-0.29
Q2 (Median)	0	0	0.00	0.00
Q3	76.5	370	0.08	0.42
Max	364	2,397	0.40	3.35

Average population of a UK Parliamentary Constituency area = 89,753

5.9 The greatest difference between aggregation of data zones and postcodes is shown in Figure 5. The boundary of the Glasgow North Burgh UK parliamentary constituency is shown in Figure 5. The overall difference between aggregation from postcode and datazone is 2,397 people, most of these additional people are located in the data zones around the south of the boundary and not the large addition to the North East.

Figure 5: UK Parliamentary Constituency Boundary for Glasgow North Burgh (S14000031) built by Postcodes, Output Areas and Data Zones



Legend

- UK Parliamentary Constituency Boundary (S14000031)
- 2011 Frozen Postcodes
- 2011 Census Output Areas
- 2011 Data Zones

Results – Scottish Parliamentary Constituencies

6.1 Similarly to UK Parliamentary Constituencies, Scottish Parliamentary Constituencies (SPC) boundaries were drawn up by the Boundary Commission for Scotland and, as a result, there are several differences in the population estimates, depending on which small area unit was used to estimate them.

6.2 When population based on output areas are compared with population estimates based on postcodes, three SPC are the same, 33 SPC have higher output area based population estimates and 37 have higher postcode based population estimates.

6.3 When comparing output area derived estimates with postcode derived estimates, the largest positive difference comes to 700 additional people in Motherwell and Wishaw (+0.84 per cent) and the largest negative difference comes to -739 fewer people in Airdrie and Shotts (-0.88 per cent). On average, the differences between output area and postcode derived populations are small – around 0.16 per cent per SPC.

6.4 When population estimates based on data zones are compared with population estimates based on postcodes, four are the same, 31 SPC have higher data zone based population estimates and 33 SPC have higher postcode based population estimates.

6.5 When comparing data zone derived estimates to postcode derived estimates, the largest positive difference comes to 3,450 extra people in Glasgow Kelvin (+4.4 per cent) and the largest negative difference comes to 2,503 fewer people in Glasgow Maryhill and Springburn (-3.4 per cent).

6.6 Looking at the difference between data zone and postcode derived populations there are two SPC that have large percentage differences (Glasgow Kelvin and Glasgow Maryhill and Springburn). Upon further investigation an adjustment will be made between these two SPC in the annual population estimates.

6.7 Figure 6 shows the frequency of proportional differences between data zone based estimates versus postcode based estimates and Figure 7 shows output area based estimates versus postcode based estimates.

6.8 The quartile differences and quartile percentage differences of the estimates based on data zones or output areas against estimates based on postcodes for SPC are shown in Table 4.

Figure 6: Frequency of proportional differences of Scottish Parliamentary Constituencies Populations (compared with Postcode Populations) – Data Zones

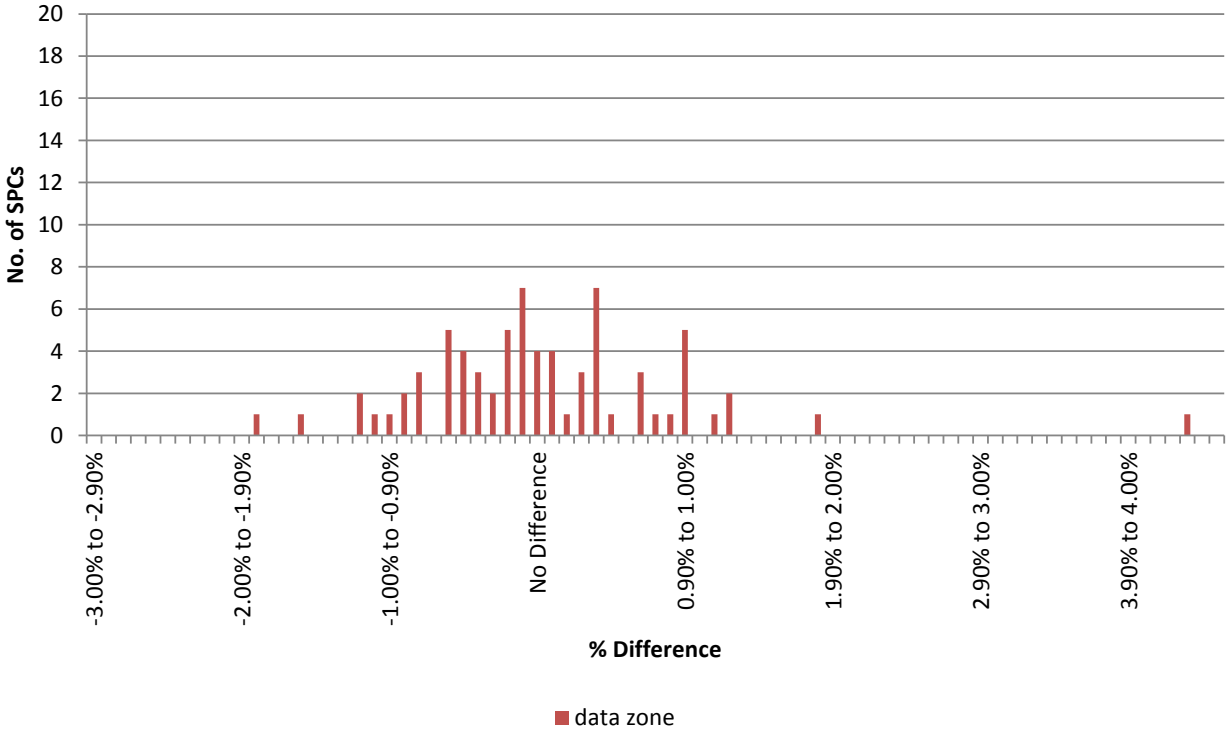


Figure 7: Frequency of proportional differences of Scottish Parliamentary Constituencies Populations (compared with Postcode Populations) – Output Area

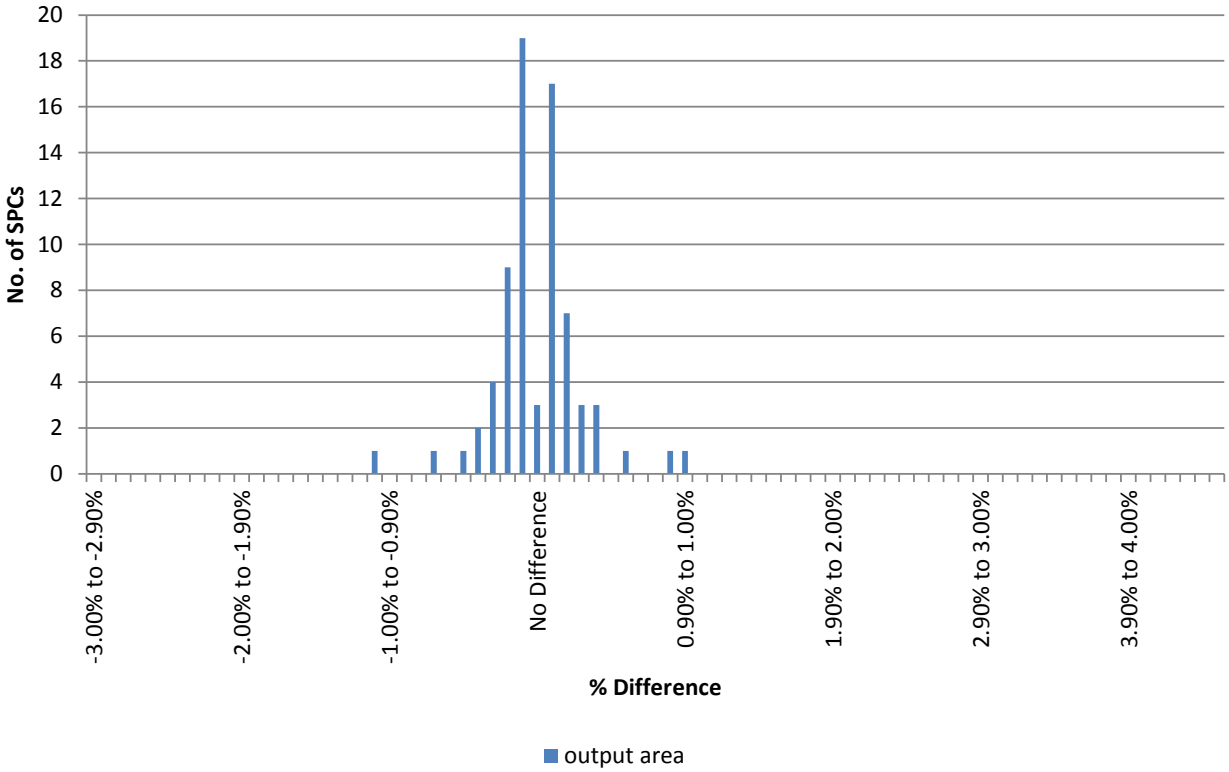


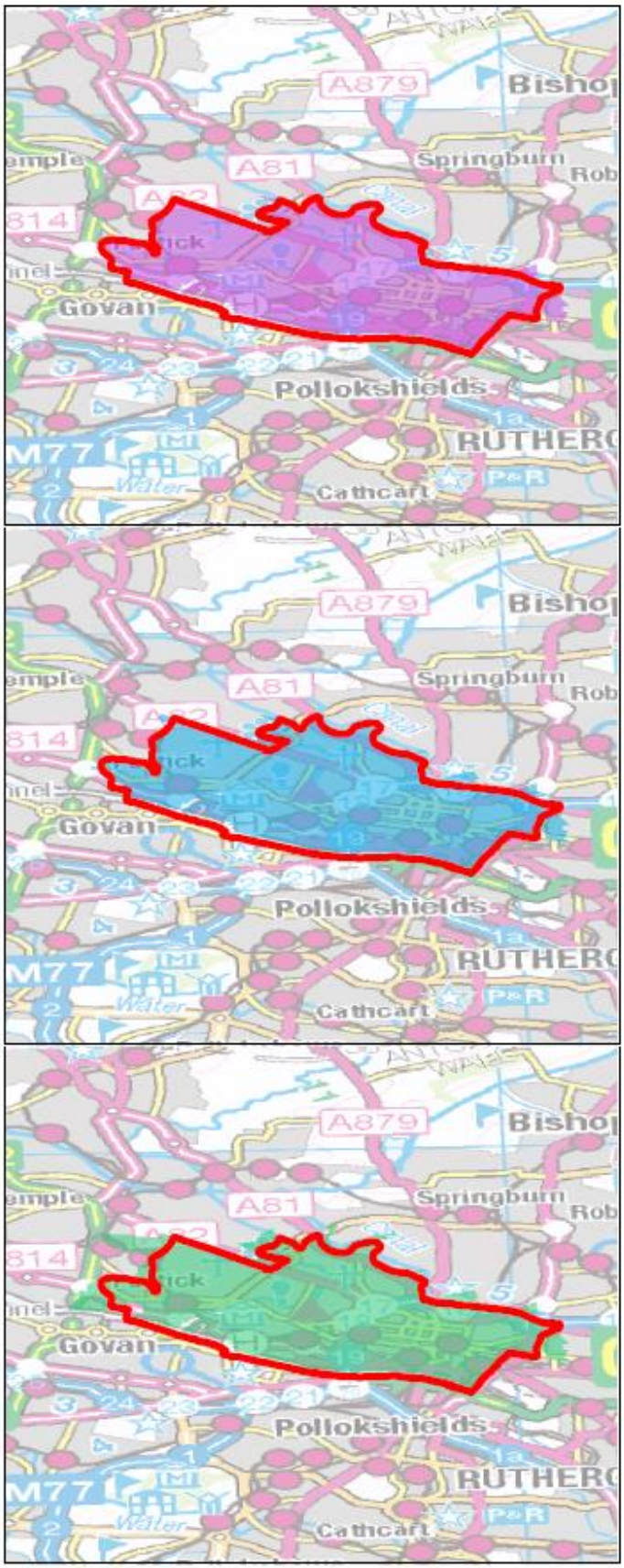
Table 4: Scottish Parliamentary Constituencies (SPC) Population Estimates

SPC Summary	Output area versus Postcode	Data zone versus Postcode	Output area vs. Postcode (%)	Data zone vs. Postcode (%)
Min	-739	-2,503	-1.05	-3.35
Q1	-71	-320	-0.10	-0.48
Q2 (Median)	-12	-13	-0.02	-0.02
Q3	67	278	0.08	0.36
Max	700	3,450	0.95	4.36

Average population of a Scottish Parliamentary Constituency area = 72,540

6.9 The Glasgow Kelvin Scottish Parliamentary Constituency boundary and different population estimates produced by aggregating postcodes, output areas and data zones are shown in Figure 8. There is a difference of 3,450 people depending on whether you aggregate from postcodes or data zones. Most of these additional people come from the west side of the constituency. Several densely populated data zones are added to this constituency due to the location of the population weighted centroid.

Figure 8: Scottish Parliamentary Constituency Boundary (S16000117) built up by Postcodes, Output Areas and Data Zones



Results – Multi-Member Wards

7.1 As a relatively small geography, with non-standard boundaries drawn up by the Local Authority Boundary Commission, matches to Multi-Member Wards (MMW) are likely to be quite difficult.

7.2 When population estimates based on output areas are compared with population estimates based on postcodes, 11 are the same, 169 MMW have higher output area based population estimates and 173 have higher postcode based population estimates.

7.3 When comparing output area derived estimates with postcode derived estimates, the largest positive difference comes to 337 additional people in Hamilton West and Earnock (+1.8 per cent) and the largest negative difference comes to 291 fewer people in City Centre (S13002593, City of Edinburgh) (-1.2 per cent). On average, the difference between output area and postcode derived populations is around 0.56 per cent per MMW.

7.4 When population estimates based on data zones are compared with population estimates based on postcodes, nine MMW are the same, 179 MMW have higher data zone based population estimates and 165 have higher postcode based population estimates.

7.5 When comparing data zone derived estimates with postcode derived estimates, the largest positive difference comes to 1,803 additional people in Sighthill / Gorgie (+4.8 per cent) and the largest negative difference comes to -2,074 fewer people in City Centre (S01002593, City of Edinburgh) (-8.5 per cent).

7.6 On average, the difference between data zone and postcode derived populations is around 3.04 per cent per MMW. Assuming a cut-off of plus or minus 2.5 per cent for data zone vs. postcode populations, 231 MMW out of 353 MMW fall out of the cut-off points.

7.7 The frequency of proportional differences between data zone based estimates versus postcode based estimates are shown in Figure 9 and output area based estimates versus postcode based estimates are shown in Figure 10.

7.8 The Min, 10th, 25th, 50th, 75th, 90th and Max percentile differences and quartile percentage differences of the estimates based on data zones or output areas against estimates based on postcodes for MMW are shown in Table 5.

Figure 9: Frequency of proportional differences of Multi-Member Wards Populations (compared with Postcode Populations) – Data Zones

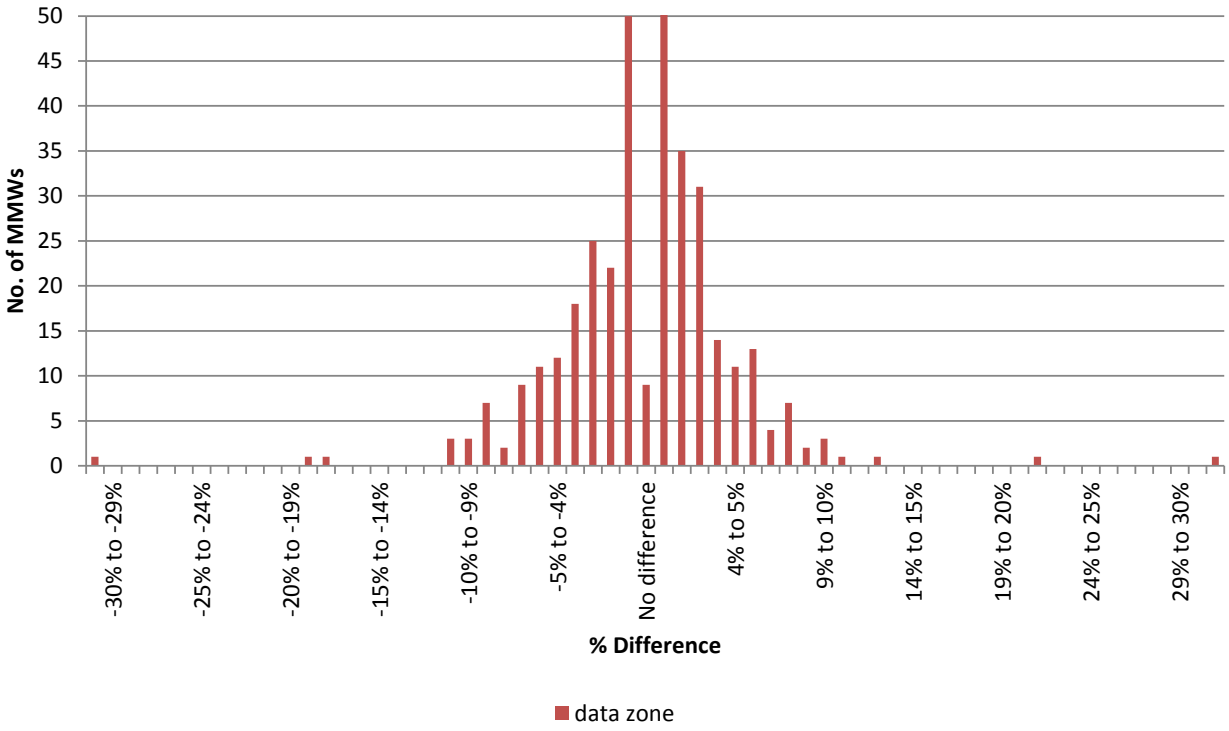


Figure 10: Frequency of proportional differences of Multi-Member Wards Populations (compared with Postcode Populations) – Output Area

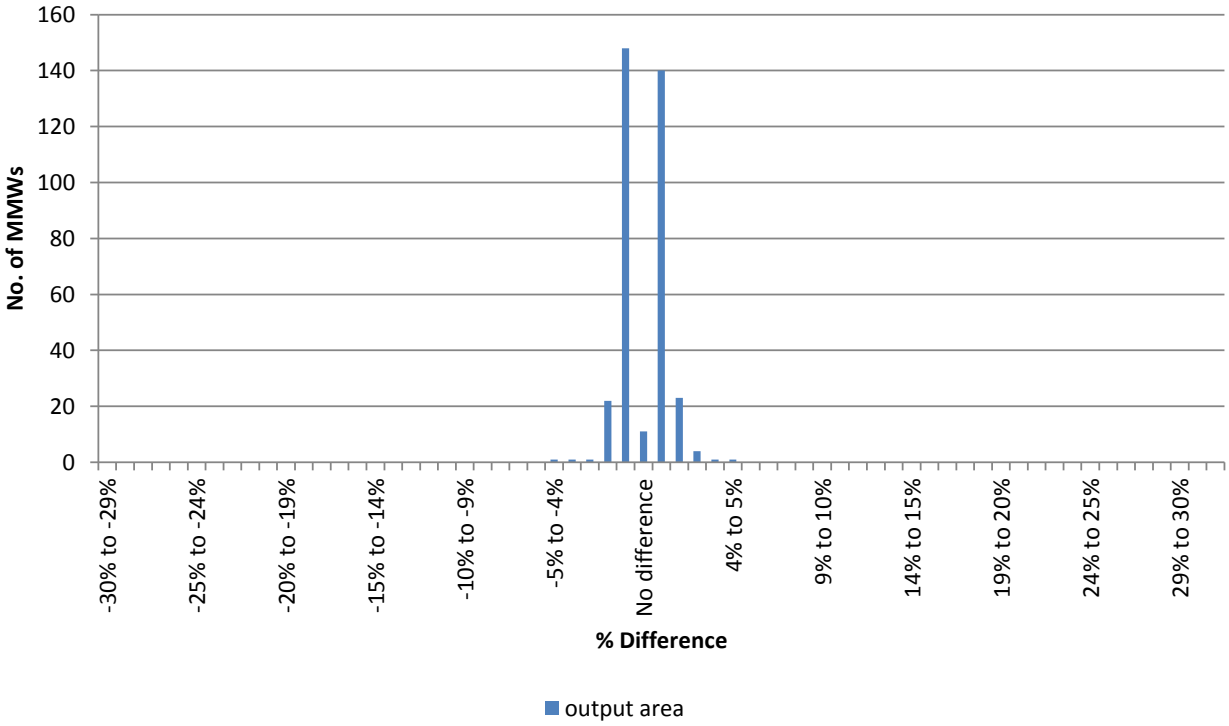


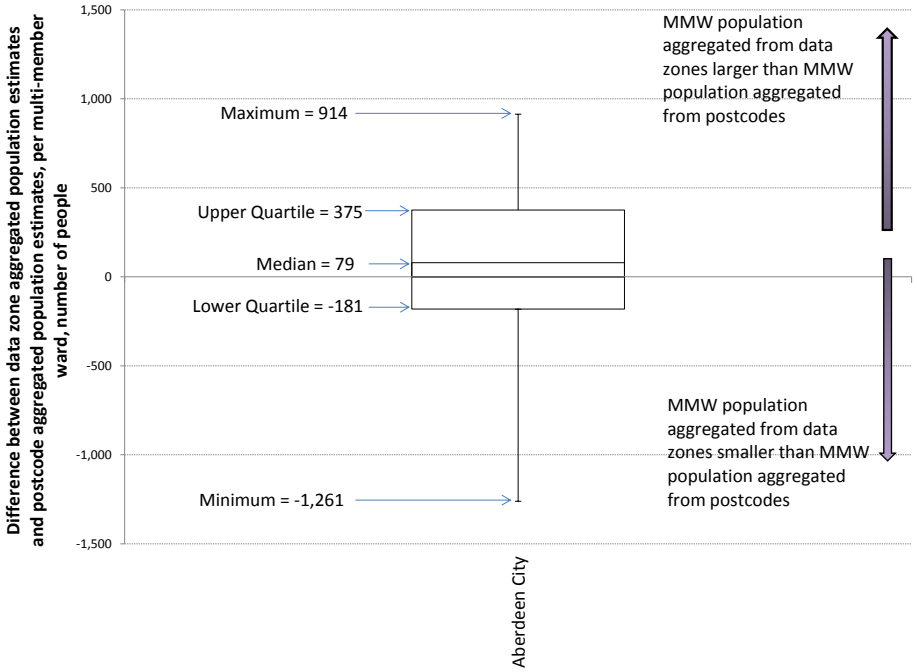
Table 5: Multi-Member Wards (MMW) Population Estimates

MMW Summary	Output area versus Postcode	Data zone versus Postcode	Output area versus Postcode	Data zone versus Postcode
Min	-291	-2,074	-4.7	-30.1
10%	-122	-639.8	-0.8	-5.4
25% (Q1)	-57	-281	-0.4	-2.2
50% (Q2)	0	5	0.0	0.0
75% (Q3)	54	291	0.4	2.1
90%	122.4	601.4	0.8	4.7
Max	337	1,803	4.0	32.0

Average population of a multi-member ward area = 15,001

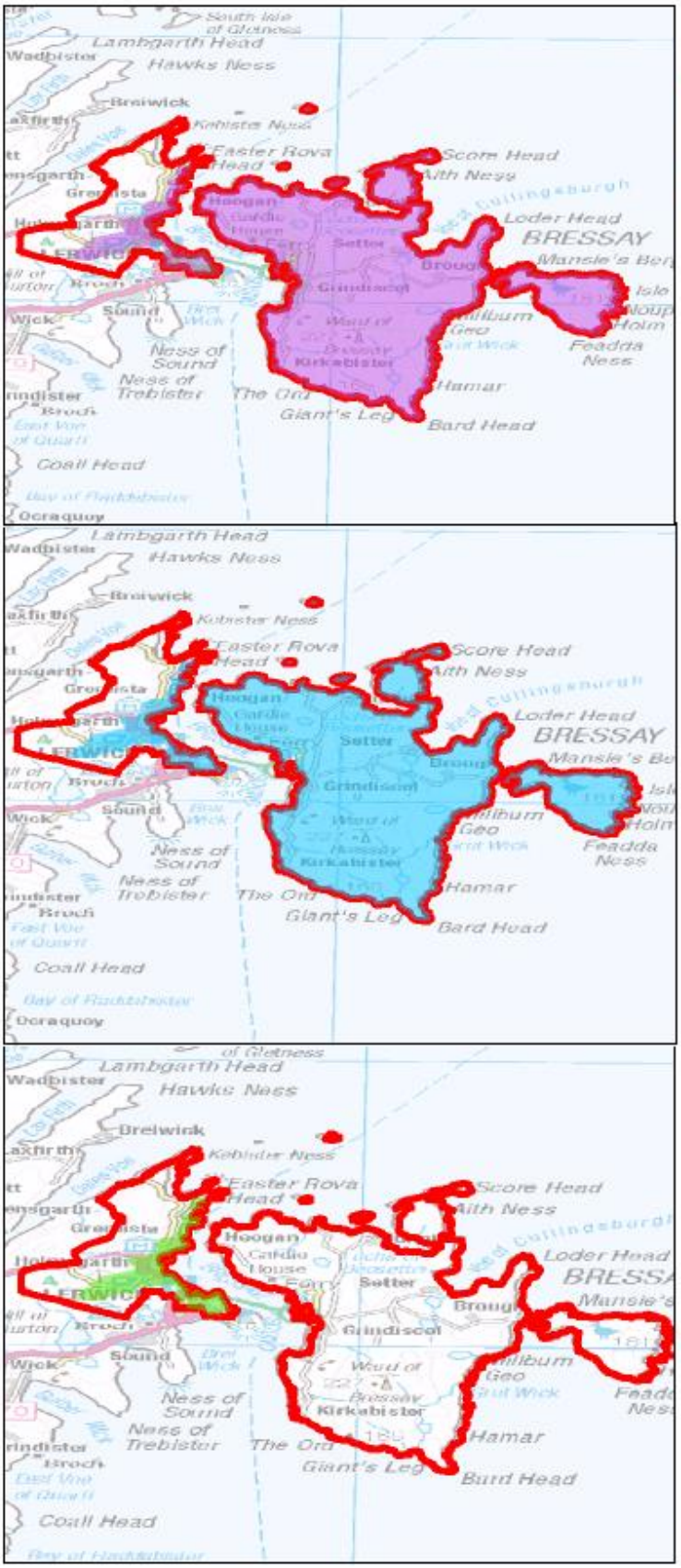
7.9 The geographic boundary for the Lerwick North Multi-Member Ward is shown in Figure 11 and the population difference aggregating from postcodes, output areas and data zones. Neither postcodes, output areas nor data zones are fit well to the multi-member ward boundary. However in this example the data zone aggregation is an especially bad fit with a large proportion of the data zone not included in the aggregation due to the location of the population weighted centroid.

7.10 Figure 12 shows a box plot of difference between Multi-Member Wards aggregated from data zones compared with aggregating from postcodes for Council areas. Taking Aberdeen City as the example, the maximum difference between the MMW aggregated from data zone versus postcode is 914 people. The minimum is 1,261 people (i.e. the postcode aggregation gives 1,261 more people than the data zone aggregation). The quartiles show the population difference below which a particular percentage of the difference between Multi-Member Ward populations lie[2]. So 50 per cent of the MMW's for Aberdeen City have a difference of between 375 people more in the data zone aggregated MMW population estimates and 181 more in the post code aggregated MMW population estimates.



Footnote
2) The lower quartile is the same as the 25th percentile and the upper quartile is the same as the 75th percentile.

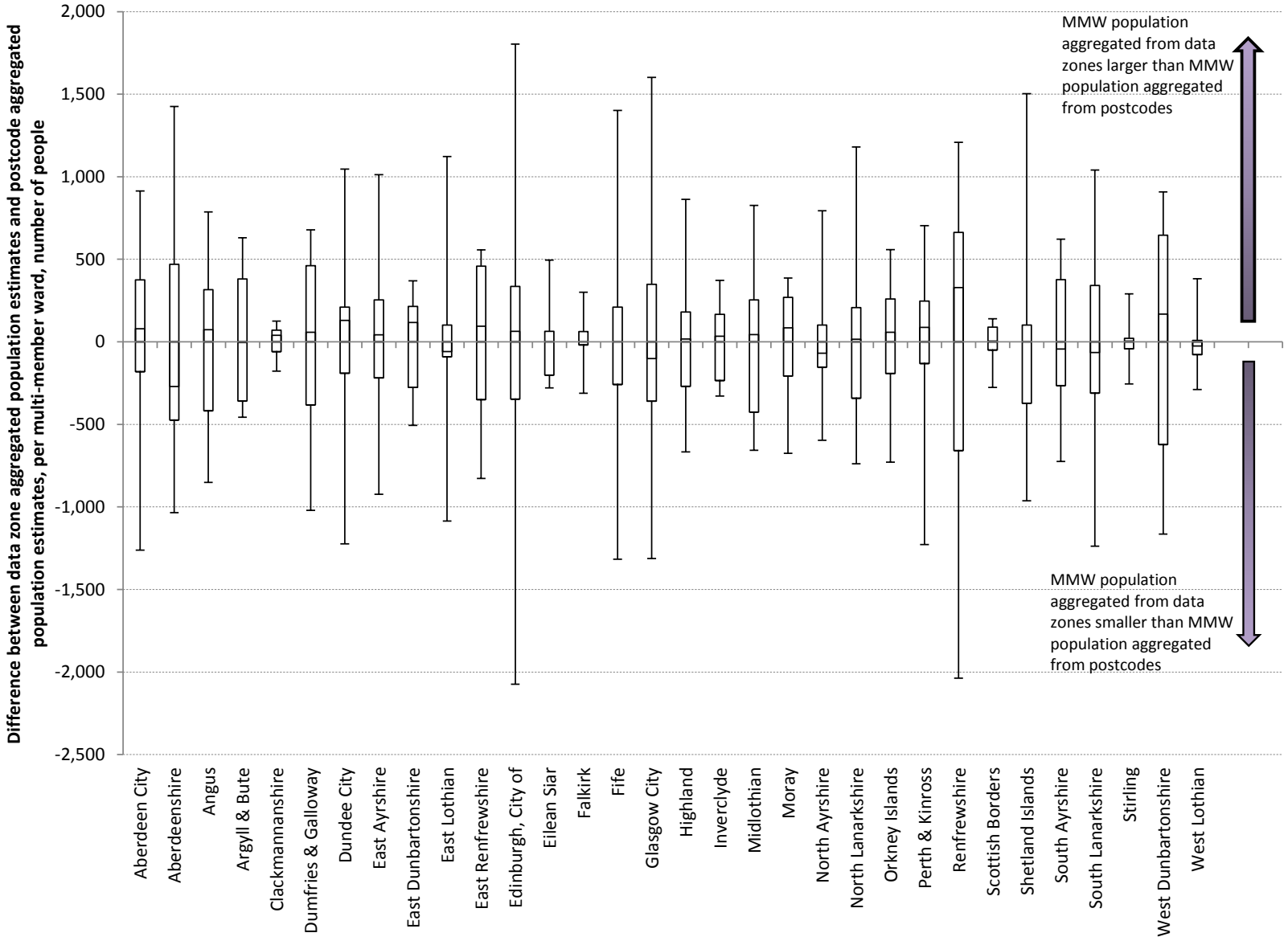
Figure 11: Multi-Member Ward (S13002777) built up from Postcode, Output Areas and Data Zones



Legend

- Multi-Member Ward Boundary (S13002777)
- 2011 Frozen Postcodes
- 2011 Census Output Areas
- 2011 Data Zones

Figure 12: Population difference between Multi-Member Wards (MMW) aggregated from data zones versus postcodes, by Council area



Results – Nomenclature of Units for Territorial Statistics (NUTS)

8.1 The European Union NUTS Regulation, enacted in June 2003, formalised the statistical geography (Nomenclature of Units for Territorial Statistics) of the European Union (EU). The United Kingdom (UK) NUTS structure was established in 1998 following an extensive consultation exercise. There are three levels of NUTS geography. It is a hierarchical structure – in the UK there are currently 12 NUTS1 areas (Northern Ireland, Scotland, Wales and the nine Government Office Regions in England), 37 NUTS2 Areas and 139 NUTS3 Areas. In Scotland there are four NUTS2 areas, 23 NUTS3 areas and 41 NUTS4/ Local Area Unit 1 (LAU1) areas.

Nomenclature of Units for Territorial Statistics 3 (NUTS3):

8.2 When population estimates based on output areas are compared with population estimates based on postcodes, 18 are the same, two NUTS areas have higher output area based population estimates and three have higher postcode based population estimates.

8.3 When comparing output area derived estimates with postcode derived estimates, the largest positive difference comes to 27 additional people in Caithness & Sutherland and Ross & Cromarty (+0.03 per cent) and the largest negative difference comes to 20 fewer people in Inverness & Nairn and Moray, Badenoch & Strathspey (-0.01 per cent). On average, the difference between output area and postcode derived populations are around 0.00 per cent per NUTS area.

8.4 When population estimates based on data zones are compared with population estimates based on postcodes, 17 are the same, three NUTS areas have higher data zone based population estimates and three have higher postcode based population estimates.

8.5 When comparing data zone derived estimates with postcode derived estimates, the largest positive difference comes to 438 additional people in Glasgow City (+0.07 per cent) and the largest negative difference comes to 451 fewer people in North Lanarkshire (-0.13 per cent).

8.6 On average, the difference between data zone and postcode derived populations is around 0.04 per cent per NUTS areas. Assuming a cut-off of plus or minus 2.5 per cent for data zone versus postcode populations, no NUTS3 areas fall out of the cut-off points.

8.7 The frequency of the proportional differences between data zone based estimates versus postcode based estimates are shown in Figure 13 and output area based estimates versus postcode based estimates are shown in Figure 14.

8.8 The Min, 10th, 25th, 50th, 75th, 90th and Max percentile absolute differences and quartile percentage differences of the estimates based on data zones or output areas against estimates based on postcodes for NUTSs are shown in Table 6.

Figure 13: Frequency of proportional differences of Nomenclature of Units for Territorial Statistics 3 (NUTS3) Populations (compared with Postcode Populations) – Data Zones

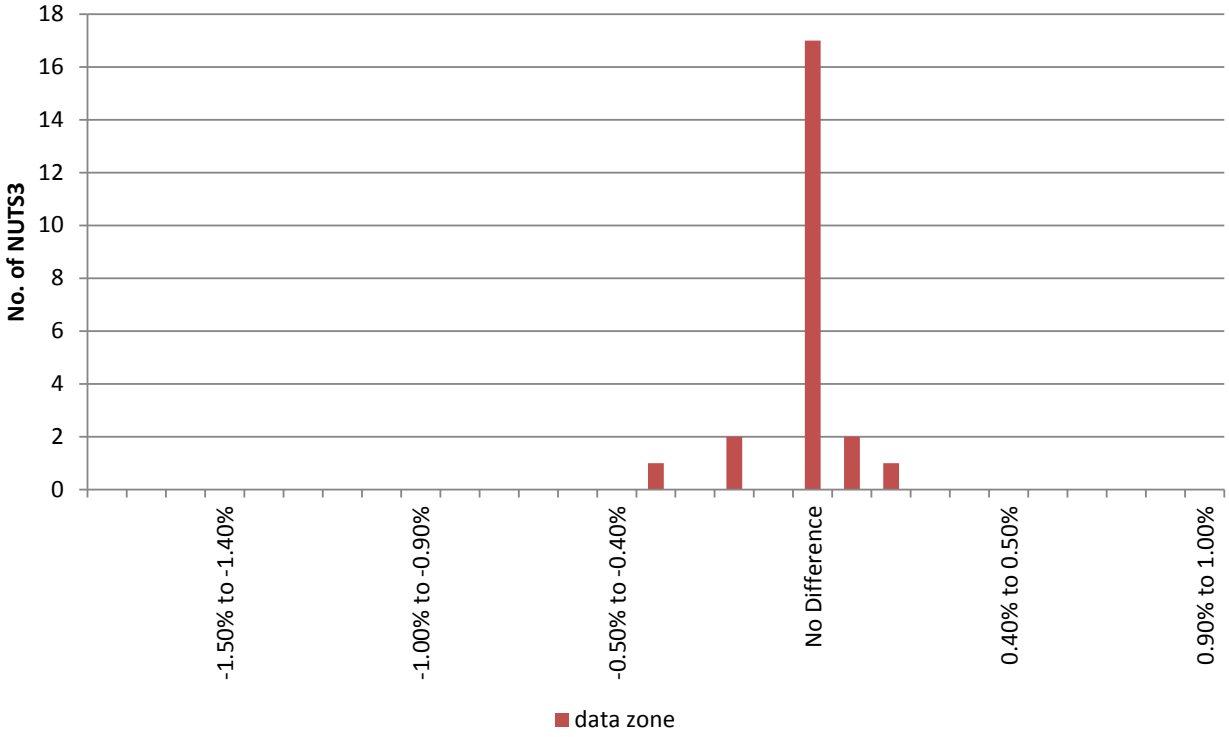


Figure 14: Frequency of proportional differences of Nomenclature of Units for Territorial Statistics 3 (NUTS3) Populations (compared with Postcode Populations) – Output Area

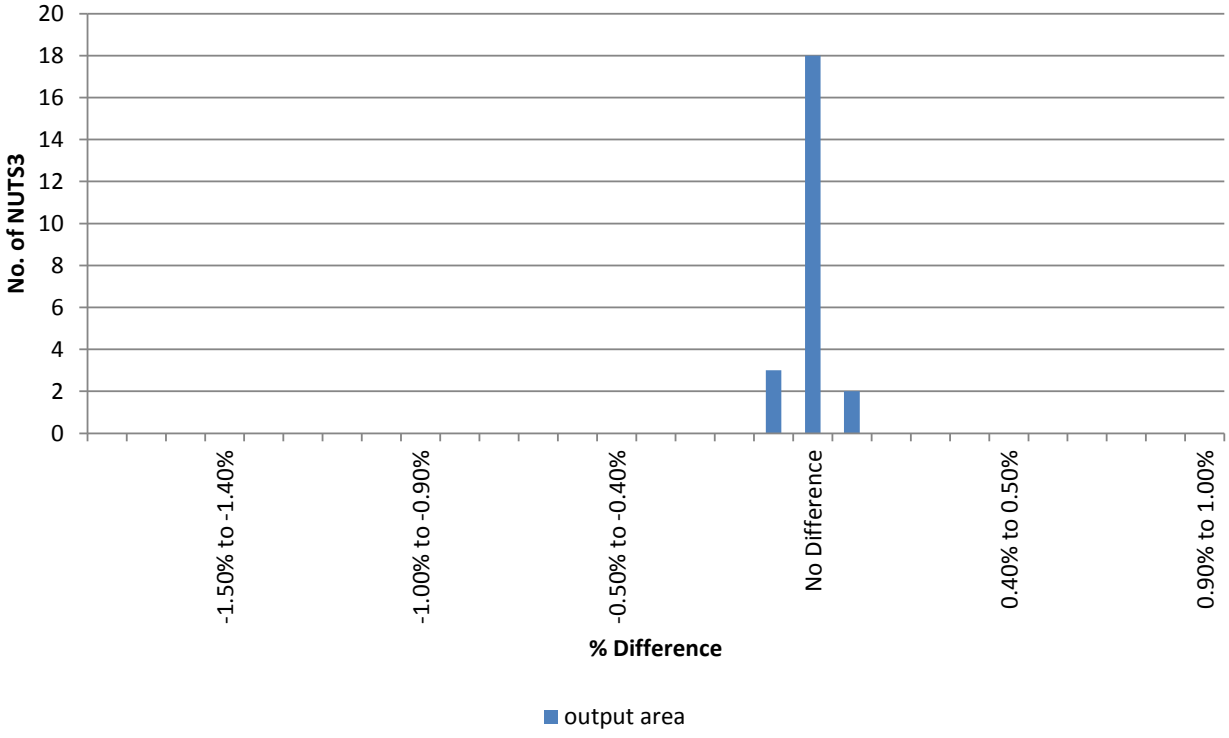


Table 6: Nomenclature of Units for Territorial Statistics 3 (NUTS3) Population Estimates

NUTS Summary	Output area vs. Postcode (Abs.)	Data zone vs. Postcode (Abs.)	Output area vs. Postcode (%)	Data zone vs. Postcode (%)
Min	-20	-451	-0.01	-0.35
10%	-6	-82	0.00	-0.08
25% (Q1)	0	0	0.00	0.00
50% (Q2)	0	0	0.00	0.00
75% (Q3)	0	0	0.00	0.00
90%	0	158	0.00	0.00
Max	27	438	0.03	0.13

Average population of a NUTS3 area = 230,235

Local Administrative Unit 1 (formally NUTS4):

8.9 When population estimates based on output areas are compared with population estimates based on postcodes, 32 are the same, four Local Administrative Units (LAUs) have higher output area based population estimates and five have higher postcode based population estimates.

8.10 When comparing output area derived estimates with postcode derived estimates, the largest positive difference comes to 48 additional people in Angus (+0.04 per cent) and the largest negative difference comes to 48 fewer people in Dundee City (-0.03 per cent). On average, the difference between output area and postcode derived populations is around 0.01 per cent per LAUs.

8.11 When population estimates based on data zones are compared with population estimates based on postcodes, 29 are the same, five LAUs have higher data zone based population estimates and seven have higher postcode based population estimates.

8.12 When comparing data zone derived estimates with postcode derived estimates, the largest positive difference comes to 410 additional people in North East Moray (+0.59 per cent) and the largest negative difference comes to -410 fewer people in West Moray (-1.73 per cent).

8.13 On average, the difference between data zone and postcode derived populations is around 0.14 per cent per LAU. Assuming a cut-off of plus or minus 2.5 per cent for data zone versus postcode populations, no LAU fall out of the cut-off points.

8.14 The frequency of proportional differences between data zone based estimates versus postcode based estimates are shown in Figure 15 and output area based estimates versus postcode based estimates are shown in Figure 16.

8.15 The Min, 10th, 25th, 50th, 75th, 90th and Max percentile absolute differences and quartile percentage differences of the estimates based on data zones or output areas against estimates based on Postcodes for LAUs are shown in Table 7.

Figure 15: Frequency of proportional differences of Local Administrative Unit 1 (LAU1) Populations (compared with Postcode Populations) – Data Zones

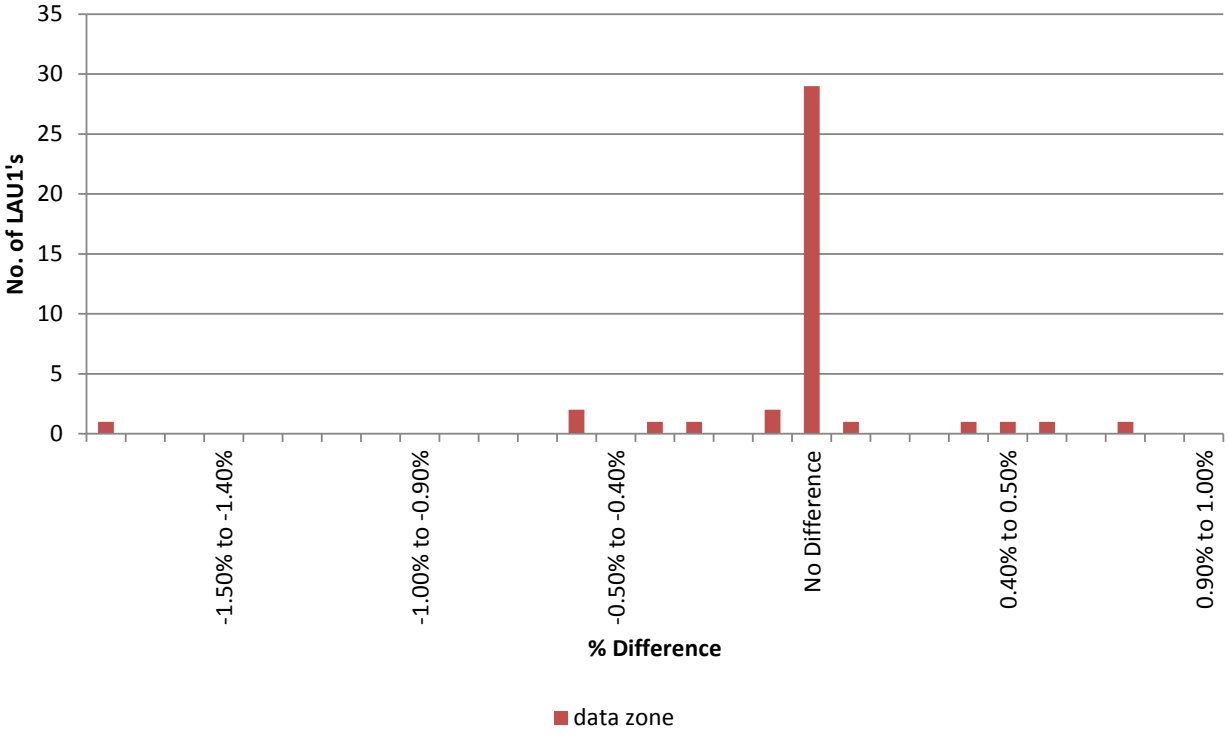


Figure 16: Frequency of proportional differences of Local Administrative Unit 1 (LAU1) Populations (compared with Postcode Populations) – Output Area

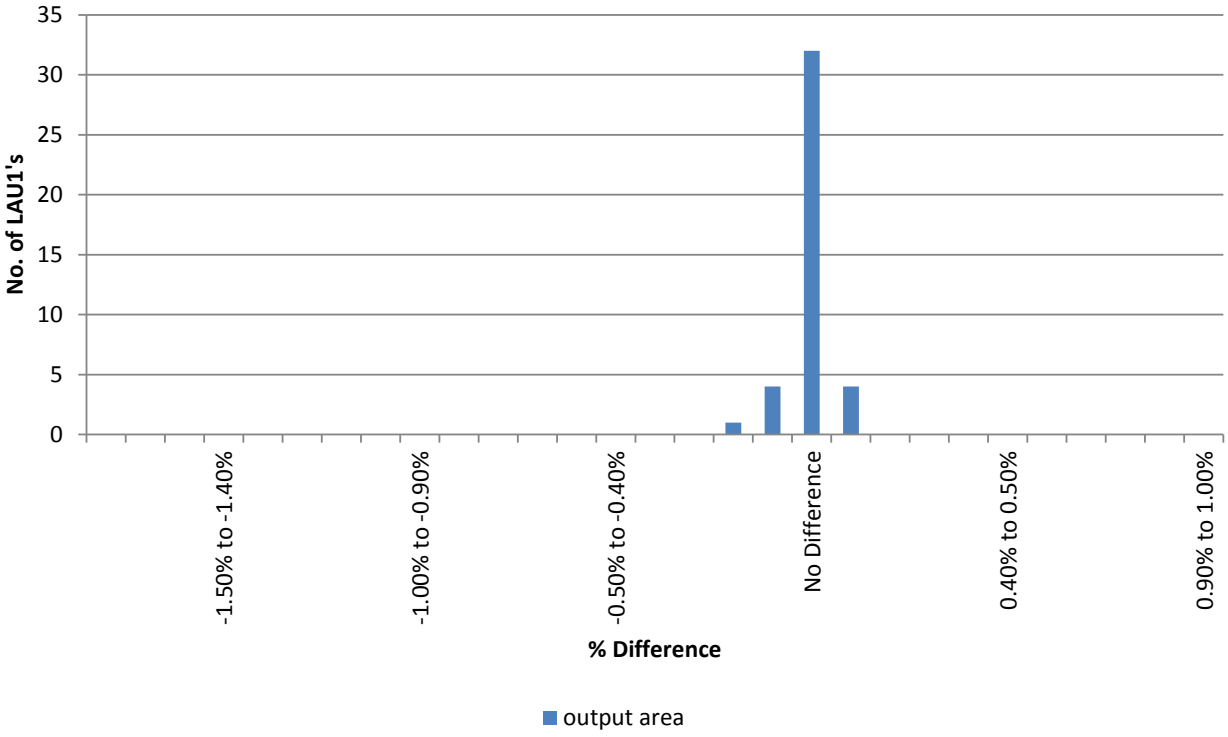


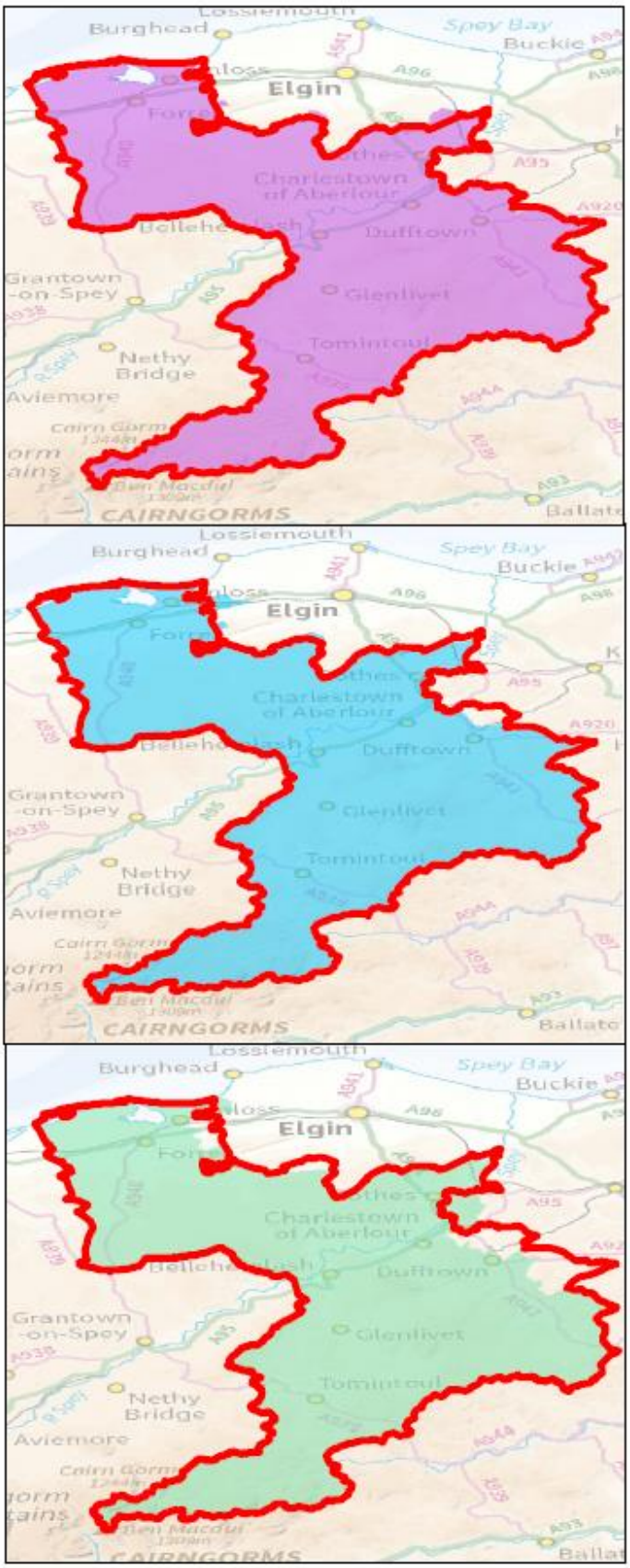
Table 7: Local Administrative Unit 1 (LAU1) Population Estimates

LAU Summary	Output area vs. Postcode (Abs.)	Data zone vs. Postcode (Abs.)	Output area vs. Postcode (%)	Data zone vs. Postcode (%)
Min	-48	-410	-0.20	-1.73
10%	-2	-81	-0.02	-0.23
25% (Q1)	0	0	0.00	0.00
50% (Q2)	0	0	0.00	0.00
75% (Q3)	0	0	0.00	0.00
90%	0	48	0.00	0.04
Max	48	410	0.07	0.72

Average population of a LAU1/ NUTS4 area = 129,156

8.16 The Local Administrative Unit 1 boundary for West Moray, and the corresponding area when aggregating population from postcodes, output areas and data zones are shown in Figure 17. For West Moray, there is a difference of 410 people depending on whether you aggregate population estimate from postcodes or data zones (i.e. the aggregated postcode estimates are 410 higher than the aggregated data zone estimates).

Figure 17: Local Administrative Unit 1 boundary (S30000032) built up by Postcode, Output Area and Data Zone



Summary and Conclusions

9.1 The average proportional difference of the estimates based on the data zones or output areas against estimates based on postcodes are shown in the Table 8.

Table 8: Summary Table

Non-standard Geography	Average Population	Output Area based estimates		Data Zone based estimates	
		No. of areas with different populations to Postcode based estimates	Av. Difference to population estimated by postcode (%)	No. of areas with different populations to Postcode based estimates	Av. Difference to population estimated by postcodes (%)
National Parks (2)	17,097	2 / 2 (100%)	0.57	2 / 2 (100%)	3.89
CHPs (34)	155,747	3 / 34 (8.8%)	0.00	3 / 34 (8.8%)	0.01
UKPCs (59)	89,753	48 / 59 (81.4%)	0.11	49 / 59 (83.1%)	0.58
SPCs (73)	72,540	70 / 73 (95.9%)	0.16	69 / 73 (94.5%)	0.60
MMWs (353)	15,001	342 / 353 (96.9%)	0.56	344 / 353 (97.5%)	3.04
NUTS3 (23)	230,235	5 / 23 (21.7%)	0.00	6 / 23 (26.1%)	0.04
LAU1 (41)	129,156	9 / 41 (22%)	0.01	12 / 41 (29.3%)	0.14

9.2 Assuming that postcode based estimates are the closest available estimates to the true population of non-standard geographies, then output areas (only available for the 2011 Census) provide estimates that are very close to postcode based estimates for all geographies.

9.3 2011 data zones can be used to produce very close estimates for Community Health Partnerships, UK Parliamentary Constituencies, Scottish Parliamentary Constituencies, Nomenclature of Units for Territorial Statistics 3 (NUTS3), NUTS3 and Local Administrative Unit 1 (LAU1) areas. They can also be used to produce reasonable estimates for most National Parks and Multi-Member Wards (MMW) (averaging less than 5 per cent difference in population estimates). Although the fit for some MMWs from 2011 data zones is not good.

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